

REMARKS

I. STATUS OF THE CLAIMS

This Preliminary Amendment is submitted in response to the Final Office Action issued May 30, 2003. Claims 1-4, 6-7, 10 and 15-20 are pending. Withdrawn claims 12-14 have been canceled with the understanding that Applicants may pursue these claims in a future divisional application. Claims 1 and 10 have been amended to further limit the range of the film's mean pore size. Support for this amendment can be found in the specification at, for example, page 18, lines 21-30. Claim 1 has also been amended to include a range of values for both film thickness and resistance to the passage of air. Support for these limitations can be found in the specification at, for example, page 18, lines 31-34 and page 21, lines 28-30, respectively. No new matter has been added by any of the amendments.

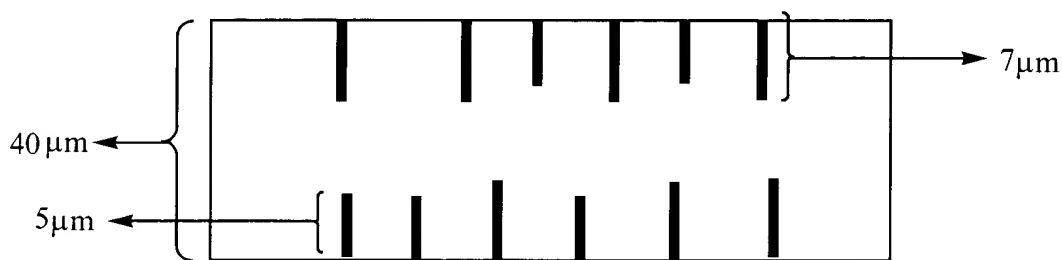
II. REJECTION UNDER § 102(b) OR, ALTERNATIVELY, UNDER § 103(a)

Claims 1-4, 6-7, 10, 15-18 and 20 were rejected in the Final Office Action under 35 U.S.C. § 102(b) as anticipated by, or in the alternative, under 35 U.S.C. § 103(a) as obvious over U.S. Pat. No. 5,510,395 to Tomioka *et al.* ("*Tomioka*").

According to the Examiner, *Tomioka* discloses a porous polyimide insulating film comprising fine continuous pores that possess Applicants' claimed limitation of being in the center and reaching to both surfaces of the film. While the Examiner acknowledges that *Tomioka* does not specifically disclose a porous structure having fine continuous pores reaching to both surfaces of the film, the Examiner maintains that the *Tomioka* film is substantially identical to the claimed invention in all other aspects, and therefore would inherently possess the fine continuous pores reaching to both surfaces. The Examiner points to column 11, lines 15-18 of *Tomioka* as teaching that the film has a large number of elliptic pores having a length of 5 to 7 microns and a width of 1 to 3 microns over the entire area of the film. The Examiner then cites Examples 1-4 in *Tomioka* as teaching porous films with pore widths of 1 to 3 microns and considers it "clearly apparent that the fine continuous pores in the center and both surfaces of the film have been included in the *Tomioka* reference."

Applicants respectfully traverse the Examiner's rejection of claims 1-4, 6-7, 10 and 15-20. *Tomioka* does not teach the formation of continuous channels but merely teaches a porous film comprising elliptic pores having a length (major axis) and a width (minor axis).

Ten Examples are disclosed in the specification of *Tomioka*. None of these ten Examples describes the preparation of a film having continuous channels that reach from one surface of the film to the other. Table 1 shows that the thickness of films prepared in Examples 1-4 ranges from 40-41 μm (see column 11, lines 20-30). However, the length of the elliptic pores present on the surfaces of these films ranges from only 5-7 μm . Thus, as depicted in the cartoon below, there is no possible way for these pores to reach from one surface of the film to another.



cross-section of a film of *Tomioka*

Similarly, as shown in Table 2, the films representing Examples 5-10 have an average thickness of 17-21 μm (col. 12, lines 14-22) while the length of the elliptic pores present on the surfaces of these films ranges from only 2-3 μm . Such pores, which reach only about 10% into the film, cannot form continuous channels that go from one surface of the film to the other.

Further, Examples 1-4 describe the preparation of a porous film by mixing a film-forming solution containing at least three solvents (THF, methanol and water) which are poor solvents for the polyimide precursor, casting this mixture onto a substrate, and then heating to effect imidization. Because the film was heated before being contacted with a solidifying solvent, the formation of continuous channels through replacement of the solvents in the film-forming solution with the solidifying solvent cannot occur. In contrast, in Applicants' invention, it is necessary to bring the film-forming solution cast onto a substrate into contact with a solidifying solvent to cause a phase separation (*i.e.* a viscoelastic phase separation) that results in a porous

film with continuous channels, as described in Applicants' specification at, for example, page 7, line 35 through page 8, line 8 and in Examples 1-6. Thus, the non-use or use of a solidifying solution determines whether continuous channels are able to form and distinguishes the porous film described in *Tomioka* from the porous film claimed by Applicants.

A 37 C.F.R. § 1.132 declaration by Dr. Y. Kusuki, which accompanies this preliminary amendment, clarifies the physical properties of the film described in Example 4 of *Tomioka* so as to establish the difference in configuration between the films of Applicants' invention and the films taught and suggested by *Tomioka*. By repeating the procedure described in Example 4 of *Tomioka*, Dr. Kusuki obtained a film that he analyzed via scanning electron microscopy (SEM). As seen in Figures 1 and 2, the elliptic pores present on the surface of the prepared film were found to exist independently from each other. Figures 3 and 4 show that the surface of the film is uneven and has no open pores. Figure 3, in particular, shows the film surface opposite to the glass substrate side while Figure 4 shows the glass substrate side.

The hydrogen permeability of the *Tomioka* film was measured to be 23,000 sec/100 cc. The nitrogen gas permeability was measured to be 62,000 sec/100 cc. The resistance of the prepared film to the passage of air exceeded the 7200 sec/100 cc limits of the measuring device, which places it outside the limits of Applicants' claim 1 recitation of a resistance to the passage of air of from 30 sec/100 cc to 2000 sec/100 cc. These permeability and resistance measurements confirm Applicants' statements in the response filed on March 19, 2003 that Applicants' film exhibits good gas permeability but no gas separation performance while *Tomioka* teaches films with both gas permeability and gas separation properties. There is no motivation or teaching by *Tomioka* that would motivate one of ordinary skill in this art to prepare Applicants' film with continuous channels reaching to both surfaces of the film in a nonlinear fashion with the appropriate gas permeability but with no gas separation properties. As such, Applicants respectfully request that the rejection of claims 1-4, 6-7, 10 and 15-20 under § 102(b) or, alternatively, under § 103(a) be withdrawn.

In addition, the Examiner rejects claim 19 under 35 U.S.C. § 103(a) as being unpatentable over *Tomioka* in view of U.S. Pat. No. 4,474,662 to Makino *et al.* ("*Makino*"). The Examiner contends that *Makino* discloses that both 3,3',4,4'-biphenyltetracarboxylic dianhydride

and pyromellitic dianhydride may be used as the aromatic tetracarboxylic acid compound. As a result, the Examiner reasons that it would have been obvious to the skilled artisan to use 3,3',4,4'-biphenyltetracarboxylic dianhydride in place of the pyromellitic dianhydride of *Tomioka*.

As discussed above, *Tomioka* does not disclose a porous structure having fine continuous pores reaching to both surfaces of the film. *Makino* cannot remedy the deficiencies in *Tomioka* because *Makino* also does not disclose a porous structure having fine continuous pores reaching to both surfaces of the film. Instead, *Makino* discloses a process for producing porous aromatic polyimide membranes which exhibit enhanced gas and/or liquid permeating properties and gas and/or liquid separating properties (*see* column 3, lines 3-9). As such, *Makino* does not teach or suggest Applicants' film which does not exhibit gas separation properties. Therefore, Applicants respectfully request that the Examiner's rejection of claim 19 under 35 U.S.C. § 103(a) over *Tomioka* in view of *Makino* be withdrawn.

III. CONCLUSION

In view of the foregoing, Applicants respectfully request entry of the amendments to place the application in clear condition for allowance or, in the alternative, in better form for appeal. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicants' undersigned representative to expedite prosecution.

Except for issue fees payable under 37 C.F.R. §1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. §§1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account No. 50-0310. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. §1.136(a)(3).

Respectfully submitted,

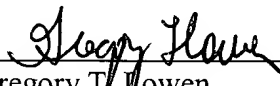
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